

Appl. No. 10/783,495  
Reply to Office Action of March 26, 2007

Attorney Docket No.: N1085-00251  
[TSMC2003-0834]

**AMENDMENTS TO THE CLAIMS**

This listing and version of the claims replaces all prior listings and versions of the claims.

**Listing of Claims:**

1. (Currently amended) A method for controlling exposure energy on a patterned wafer substrate, comprising the steps of: controlling the exposure energy with a feedback process control signal of critical dimension, and further controlling the exposure energy with a feed forward process control signal of a compensation amount that compensates for wafer thickness variations, the critical dimension being one of a width, a spacing and an opening of the patterned wafer substrate.
2. (Original) The method of claim 1, further comprising the step of: combining the feed forward control signal with the feedback process control signal to control the exposure energy.
3. (Original) The method of claim 1, further comprising the step of: supplying the feed forward process control signal by a feed forward controller.
4. (Original) The method of claim 1, further comprising the step of: controlling the exposure energy by a feed forward control signal of an interlayer thickness measurement.
5. (Previously presented) The method of claim 1, further comprising the step of: controlling the exposure energy by a feed forward control signal of an interlayer thickness measurement remaining after chemical mechanical planarization thereof.
6. (Original) The method of claim 1, further comprising the step of: calculating the compensation amount according to a polynomial function with a coefficient of the function being based on a measurement of a remaining thickness of a planarized interlayer.

Appl. No. 10/783,495  
Reply to Office Action of March 26, 2007

Attorney Docket No.: N1085-00251  
[TSMC2003-0834]

7. (Previously presented) The method of claim 1, further comprising the step of: calculating the feedback process control signal of critical dimension measurement of a top layer in a previous manufacturing lot.
8. (Previously presented) The method of claim 1, further comprising the steps of: calculating the compensation amount according to a polynomial function with a coefficient of the function being based on a measurement of a remaining thickness of a planarized interlayer; and calculating the feedback process control signal of critical dimension measurement of a top layer in a previous manufacturing lot.
9. (Original) The method of claim 1, further comprising the steps of: calculating the compensation amount according to a polynomial function with higher order coefficients set at zero.
10. (Original) The method of claim 1, further comprising the steps of: calculating the compensation amount according to a linear function.
11. (Original) The method of claim 1, further comprising the steps of: calculating the compensation amount according to a segmented linear function.
12. (Currently Amended) A system for controlling exposure energy on a first patterned wafer substrate, comprising:
  - a feed forward controller providing a feed forward control signal to an exposure apparatus based on a thickness measurement of an interlayer of the first patterned wafer substrate for controlling the exposure energy focused on a top layer of the first patterned wafer substrate, and
  - a feedback controller providing a feedback exposure energy control signal to the exposure apparatus based on critical dimension measurement of a top layer of a second patterned wafer substrate of a previous manufacturing lot, the critical dimension being one of a width, a spacing and an opening of the second patterned wafer substrate.

Appl. No. 10/783,495  
Reply to Office Action of March 26, 2007

Attorney Docket No.: N1085-00251  
[TSMC2003-0834]

13. (Original) The system of claim 12, further comprising: a thickness measurement device providing thickness measurement data to the feed forward controller.
14. (Previously presented) The system of claim 12, further comprising: a criteria dimension measurement device providing critical dimension measurement data to the feedback controller.
15. (Previously presented) The system of claim 12, further comprising:  
a thickness measurement device providing thickness measurement data to the feed forward controller and  
a critical dimension measurement device providing critical dimension measurement data to the feedback controller.
16. (Currently amended) The system of claim 12, further comprising: a thickness measurement device providing thickness measurement data of a shallow trench isolation layer of the first patterned wafer substrate to the feed forward controller.
17. (Currently Amended) The system of claim 12, further comprising: a criteria dimension measurement device providing critical dimension measurement data of a poly-gate of the second patterned wafer ~~substrate~~substrate of a previous manufacturing lot.
18. (Currently Amended) The system of claim 12, further comprising:  
a thickness measurement device providing thickness measurement data of a shallow trench isolation layer of the first patterned wafer substrate to the feed forward controller, and  
a critical dimension measurement device providing criteria dimension measurement data of a poly-gate of a previous manufacturing lot.
19. (Original) The system of claim 12 wherein,  
the feed forward controller is user configurable by having one or more polynomial coefficients set to zero in a polynomial function model.
20. (Original) The system of claim 12 wherein;

Appl. No. 10/783,495  
Reply to Office Action of March 26, 2007

Attorney Docket No.: N1085-00251  
[TSMC2003-0834]

the feed forward controller is user configurable by having one or more polynomial coefficients set to zero in a polynomial function model.

21. (Currently amended) The system of claim 20, further comprising: a thickness measurement device providing thickness measurement data of a shallow trench isolation layer of the first patterned wafer substrate to the feed forward controller.

22. (Currently Amended) The system of claim 20, further comprising: a ~~criteria-critical~~ dimension measurement device providing critical dimension measurement data of a poly-gate of the second patterned wafer ~~substrate~~substrate of a previous manufacturing lot.